

Corrosion Protection of Launch Infrastructure and Hardware Through the Space Shuttle Program

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Corrosion, the environmentally induced degradation of materials, has been a challenging and costly problem that has affected NASA's launch operations since the inception of the Space Program. Corrosion studies began at NASA's Kennedy Space Center (KSC) in 1966 during the Gemini/Apollo Programs with the evaluation of long-term protective coatings for the atmospheric protection of carbon steel. NASA's KSC Beachside Corrosion Test Site, which has been documented by the American Society of Materials (ASM) as one of the most corrosive, naturally occurring environments in the world, was established at that time. With the introduction of the Space Shuttle in 1981, the already highly corrosive natural conditions at the launch pad were rendered even more severe by the acidic exhaust from the solid rocket boosters. In the years that followed, numerous efforts at KSC identified materials, coatings, and maintenance procedures for launch hardware and equipment exposed to the highly corrosive environment at the launch pads.

Knowledge on materials degradation, obtained by facing the highly corrosive conditions of the Space Shuttle launch environment, as well as limitations imposed by the environmental impact of corrosion control, have led researchers at NASA's Corrosion Technology Laboratory to establish a new technology development capability in the area of corrosion prevention, detection, and mitigation at KSC that is included as one of the "highest priority" technologies identified by NASA's integrated technology roadmap.

A historical perspective highlighting the challenges encountered in protecting launch infrastructure and hardware from corrosion during the life of the Space Shuttle program and the new technological advances that have resulted from facing the unique and highly corrosive conditions of the Space Shuttle launch environment will be presented.